CANADA – Fisheries

Department of Fisheries of Canada

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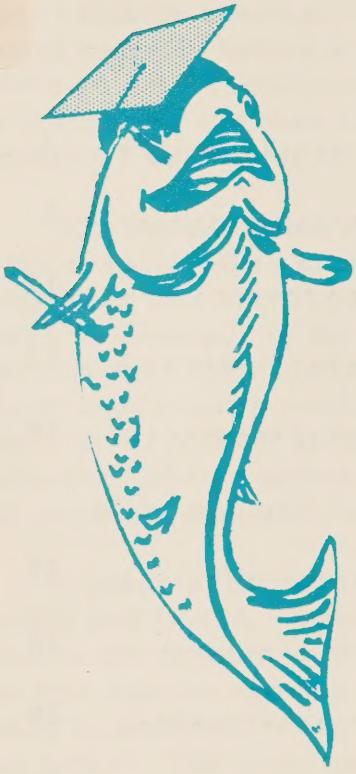

ALL ABOUT FISH

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A Manual for Teachers

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Canada's Fisheries

Fishing is the oldest industry in Canada. Extensive sea fisheries on both the Atlantic and Pacific coasts produce a wide variety of fish in huge quantities, while the vast inland water areas are also the source of many other valuable species. Altogether, nearly two billion pounds of fish are caught annually having a marketed value (fish and by-products) of about $200 million. The fisheries are thus not only of significance to the nation's economy but they also represent an important contribution to the nutritional well-being of Canadians and our customers abroad.

The conservation and development of Canadian fisheries resources is the responsibility of the federal Department of Fisheries which is assisted in this endeavour by its scientific arm, the Fisheries Research Board of Canada. In the interests of the consumer, inspection and quality controls have been instituted, and a programme of information and consumer education is conducted throughout the country. Members of the industry, organized as the Fisheries Council of Canada, and other fishery interests, take an active part in improving and expanding the variety of fish products available to the consumer.

Canada's fishing areas fall into three main divisions: Atlantic, Pacific and Inland. Many commercially important species of fish are found in the Atlantic with cod and lobsters ranking as the most valuable. The five salmon species account for more than half of the Pacific catch value; in addition, many other varieties including halibut and herring are also taken. The principal freshwater fishing grounds are the Great Lakes, the lakes of the Prairie Provinces and the Northwest Territories notably Great Slave Lake. These yield many varieties of fish.

The table on the following page gives the common varieties of fish and shellfish, some of which are common in most areas. The housewife may come across the others from time to time in her local store.

COMMON VARIETIES OF FISH FOR SALE IN CANADA

SALT WATER FISH		SHELLFISH		FRESH WATER FISH
ATLANTIC	PACIFIC	ATLANTIC	PACIFIC	
Alewives	Anchovies	Clams:-	Clams:-	Bass (White)
Bass	Cod -	(Bar)	(Razor)	Buffalo Fish
Catfish	(Black Alaska)	(Soft Shell)	(Butter)	Bullheads
Cod	(Sable Fish)	(Quahaugs)	(Little Neck)	Cisco (Tullibee or Lake Herring)
Cusk	Cod, Gray	Crabs	Crabs	Catfish
Eels	Eulachon	Lobster	Oysters	Carp
Flounder	Flounder	Mussels	Prawns	Chub
Haddock	Halibut	Oysters	Shrimps	Eels
Hake	Herring	Periwinkles		Goldeye
Halibut	Ling Cod	Scallops		Inconnu
Herring (including sardines)	Rockfish			Lake Trout
Mackerel	Salmon -			Ling or Burbot
Plaice	(Chum)			Perch (Yellow)
Pollock	(Coho)			Pickerel - (Blue) (Yellow)
Rosefish - (Ocean Perch)	(Pink)			Pike
Salmon - (Atlantic)	(Spring)			Sauger
Shad	(Sockeye)			Sheepshead
Skate	Skate			Smelts
Smelts	Sole			Sturgeon
Sole	Trout -			Sucker (Mullet)
Swordfish	(Steelhead)			Sunfish
Tuna	Tuna -			Tomcod
Witch	(Albacore)			Whitefish

Marketing and Distribution

Canadian fisheries produce fish in great variety. The product, however, is highly perishable and transport across the country is a major industrial problem. The Fisheries Research Board of Canada, other government agencies, the industry, as well as those concerned with transportation, are continually working on improved methods of refrigeration in transportation. At the present time, fresh fish packed in ice may be shipped by rail across the country. Fish may also be shipped to consumer markets by refrigerated road transport and by air freight. Supplies of fresh fish can be obtained in the larger cities throughout the country but further delay in distribution from these urban centres creates a problem of supply in the rural areas. The development of quick freezing and the wide use of frozen storage throughout the country is helping to increase the supply of fish available to all homemakers.

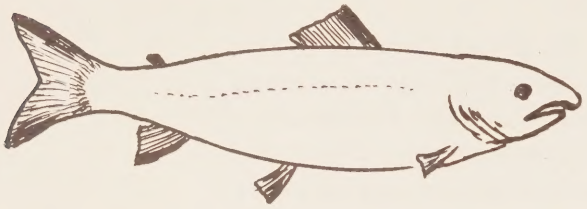
Spoilage of fresh fish may be delayed by the use of chlortetracycline and oxtetracycline in prescribed amounts regulated by the Food and Drug Act. Preservatives are not used on fish sold for export because they are not yet permitted in the countries which purchase Canadian fishery products.

Fish is availabe on the market in many forms. It may be obtained fresh, frozen, smoked, salted, pickled, dried and canned.

FRESH FISH

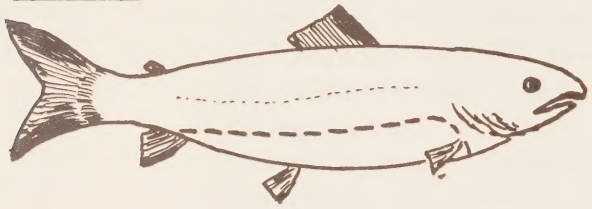
The various cuts of fresh fish are shown below;

Whole or round fish



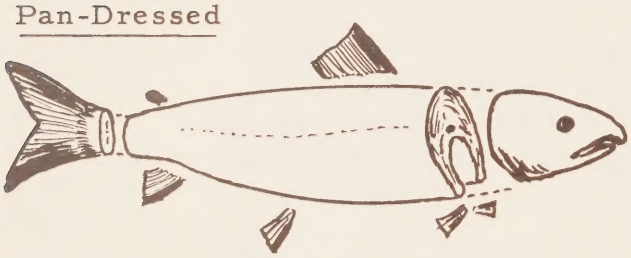
Whole or round fish are marketed just as taken from the water. To prepare for cooking, entrails, gills, fins, scales should be removed. The head and tail may be left on if desired. Small fish like smelts and trout are frequently cooked with only the entrails removed. When purchasing whole fish allow one serving per pound.

Dressed (Sometimes called drawn or gutted)



Dressed fish have entrails and gills removed. To prepare for cooking, fins and scales should be removed. The head and tail may be left on if desired. When purchasing allow one pound per serving.

Pan-Dressed

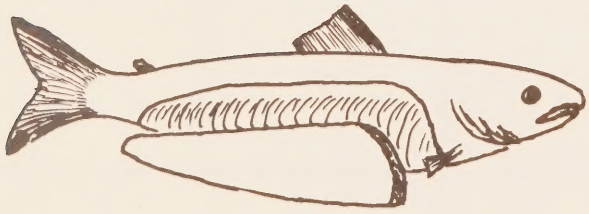


Pan dressed fish have head, tail, fins, gills, entrails and scales removed. They are ready to cook as purchased. Very large fish are frequently cut into one pound or two pound pieces.

Steaks

Steaks are cross section slices of large fish. They are ready to cook as purchased. Very large steaks may be divided by cutting through the backbone. Steaks are usually one-half to one inch thick. Allow one pound for two to three servings.

Fillets



Fillets are sides of fish cut lengthwise from the backbone. They should be practically boneless and very often the skin is removed. A fillet from one side of a fish is a single fillet. Two sides of a small fish (e.g. blue pickerel) with backbone removed and joined by the uncut skin form a butterfly fillet. Allow one pound of fillets for three servings.

SHELLFISH

The shellfish caught in Canadian waters are Lobsters, Crab, Oysters, Scallops and Shrimp. Shellfish, like other fish are available to the consumer in many forms :

Lobsters are native to the Atlantic coast and are shipped live as far as the West Coast and to Europe. Freshly boiled lobster may be purchased in the shell. More commonly the fresh cooked lobster meat is sold in cartons and tins packed in ice. Cooked lobster meat is available both frozen and canned and also frozen in cans. The supplies of lobster are controlled by regulation of the fishing season and legal size limits on the lobsters. The legal size is based on the length of the rigid body covering, or carapace. In most market areas at present the minimum legal size of carapace is three and three-sixteenth inches, equivalent to a total length of slightly more than nine inches and a weight of 15 ounces. Size limits vary from area to area depending on fisheries regulations. As a general rule the lobsters in the market weigh from one to three pounds. A lobster weighing one pound will yield approximately $\frac{1}{4}$ pound (2/3 cup) cooked meat. When serving lobster in the shell allow one small lobster or half a large lobster per person.

Pacific or Dungeness Crab are fished off the Queen Charlotte Islands, on the west coast of Vancouver Island and in the Boundary Bay area. Crab are available in western centres alive in the shell or as shelled crab meat. Canned Pacific crabmeat is available in most markets. Although crab are found in the Atlantic, they are not fished commercially to any extent on the East Coast. Crab average from 1-3/4 to 3-1/2 pounds in weight. One pound of crabmeat will serve three or four persons.

Two species of Oysters are harvested commercially in Canada: the Eastern oyster, found on the Atlantic Coast and the Japanese or Pacific oyster, found on the West Coast. Atlantic oysters which may be sold in the shell, are graded according to the shape of the shell. They are also sold as shucked meat, either fresh or frozen. The somewhat larger Pacific Oysters tend to have brittle shells and are usually marketed as shucked meat. Some Pacific oysters are canned and some are smoked and canned. Many varieties of clams are harvested both on the Atlantic and Pacific coasts. Clams are sold alive in the shell and as shucked meat in fresh, frozen and canned forms.

The Giant or Sea Scallop is found in the deep water area of the Gulf of St. Lawrence and off the North Atlantic coast from Labrador south to North Carolina. The centre of the industry is in the Digby area of the Bay of Fundy. One other variety, the Iceland scallop is also found in small quantities. It is common on the Grand Banks of Newfoundland. It is much smaller than the Sea scallop and is often mistaken for the Bay of Cape Cod scallop, which is commercially important in the United States. Scallops are shelled or "shucked" as soon as they are caught and only the tender cube of white meat which functioned as a muscle controlling the movement of the shells, is kept. This meat is packaged and marketed by the pound in both fresh and frozen forms. One pound of scallops yields three servings.

Shrimp are caught in small numbers off the coast of British Columbia. They are marketed in headless form either fresh or frozen. They are also sold as shelled cooked meat. Frozen raw shrimp are known as "green shrimp". Shrimp are graded as jumbo, large, medium and small. They range in size from 15 per pound (large) to 60 per pound (small). One pound of shrimp yields about one half pound of cooked shelled meat and will make 3 to 4 servings. Most of the Canadian shrimp are of a small pink variety. Larger shrimp are imported from the United States, Mexico or China.

FROZEN FISH

When carefully handled, frozen fish retains its freshness and may be used interchangeably with fresh fish. Small dressed fish are available in the frozen form in inland markets as are pieces of larger fish and steaks. Frozen fish is most commonly sold in the form of fillets in either one pound cellophane packages or packed in one pound cartons. Packages of fillets, boxed and wrapped are most easily handled in supermarkets and grocery stores, although in this form the consumer is not able to judge the appearance of the fillets.

SMOKED AND DRIED FISH

Smoked fish include such varieties as Atlantic cod, Alaska black cod, goldeye, cisco, haddock, salmon, sturgeon, herring, eels and whitefish. The treatment produces a distinctive flavour and helps to delay spoilage temporarily but does not preserve the fish indefinitely. It must be handled and stored with as much care as fresh fish. Kippered herrings are both salt cured and smoked. Dried salt cod may be purchased shredded or as boneless fillets. Boneless cod is usually packaged in one-pound wooden boxes. There is a large market in the Caribbean and the Mediterranean countries for Atlantic cod, heavily salted and dried. Fish in this form is not often found on the Canadian market.

CANNED FISH

Canadian fish are most widely distributed in the canned form. They are familiar to all Canadian consumers and are exported to many foreign countries. The most important of the canned species from standpoint of total annual production are salmon, sardines, and lobsters. Other familiar canned fishery products are crab, clams, oysters, mackerel, chicken haddie, and kippered snacks. There are also a variety of pickled and smoked fish and fish pastes.

Canned Salmon: Four well known varieties of canned British Columbia salmon can be found in the stores. Each variety has its own

characteristics. One difference is in the colour of the flesh. No artificial colouring is ever added during canning. The deeper coloured varieties, because of their attractive appearance, command the highest prices. Chum, or Keta, is the palest and most inexpensive of the four varieties. It is suitable for use in casserole dishes. Pink is slightly deeper in colour than chum but it is still a pale variety. Coho is a medium pink shade. It is richer than chum or pink salmon and is considered a good general purpose salmon. Choicest of all the salmon varieties is the Sockeye, which has a rich, deep red flesh.

Regulations under the Meat and Canned Foods Act, govern the production of canned fish products to ensure quality. At the present time, there is compulsory inspection of canned salmon and herring packed in British Columbia. Labels on the tins must state the name of the packer, the kind of fish and list other ingredients used as well as the net weight of the contents. There are two recognized grades of canned fish. The consumer may recognize Grade A salmon by the word CANADA embossed on the tin. In Grade B salmon, the word CANADA is replaced by GRADE B and this grade must also be stated on the label. Individual packers may produce several brands from the same variety of fish. The brands will differ in price according to appearance, colour and general condition of the contents. All brands are equally wholesome. Salmon is sold in three sizes of cans:

1 pound tall containing $15\frac{1}{2}$ ounces;
1/2 pound flat containing 7 3/4 ounces;
1/4 pound flat containing 3 3/4 ounces.

There are several varieties of tuna on the market, including Albacore and Bonito. Tuna is available as "solid pack" or "flakes". Tuna flakes are cheaper than the solid pack and may be used for casserole dishes, sandwiches, spreads, and the like. Albacore tuna is canned in Canada. Imported canned tuna is also available. The varieties labelled as "white meat tuna" will be more expensive than dark meat tuna. The different packs of tuna are:

1/2 pound flat containing 7 ounces, solid pack;
1/2 pound flat containing $6\text{-}6\frac{1}{2}$ ounces, flaked;
1/4 pound flat containing 3 3/4 ounces, solid pack.

Small herrings are canned in New Brunswick and in Canada are known as sardines. Canadian sardines are inexpensive and several million cases are exported annually. Sardines are also imported into Canada from other producing countries. The name sardines, is given to any small canned fish of the herring family. In Portugal, pilchards are canned as sardines. Norwegian sardines are of two kinds; sild and brisling or sprats. Canadian sardines are canned in $3\frac{1}{4}$ ounce flat tins. Some sardines are lightly smoked before being processed. Sardines may be packed in olive oil or more commonly in cottonseed, soya bean or peanut oil. A small quantity of sardines is also packed in tomato sauce and mustard sauce. Larger herrings are canned either as whole fish fillets or smoked as kippered snacks.

Several varieties of lean, white-fleshed Atlantic fish, cod, hake, haddock, and cusk are canned together as Chicken Haddie. The result is an inexpensive mild flavoured product suitable for salads, sandwiches or casserole dishes.

Atlantic lobster is canned only on the Canadian east coast and has a wide export market. In recent years great quantities of Maritimes lobster are shipped to American and Canadian markets, either alive or frozen. Canned lobster is in constant demand and is not always available. Lobster is usually sold in cans containing a drained weight of 5 ounces or $2\frac{1}{2}$ ounces.

Oysters and clams are packed both on the Atlantic and Pacific coasts in cans of various sizes. As with lobster, the weight stated on the label refers to the drained weight of the contents.

Pacific canneries also produce crabmeat. Canned shrimp on the Canadian market is imported.

Consumer Buying

Fresh Fish

The quality of fish is largely determined by its freshness. Fresh fish should have these characteristics.

Whole or Drawn Fish

1. The skin should be shiny and bright and the scales should cling tightly.

2. The gills should be a clear bright-red, free from slime. In time the colour fades to a light pink, then gray and finally to a brownish or greenish colour.

3. The eyes should be bright, clear and full. As fish loses its freshness the eyes become faded and cloudy and tend to become sunken.

4. The flesh should be firm and elastic to the touch and should not separate easily from the bone.

5. Fresh fish has a mild characteristic odour but no strong or fishy odour.

Fillets and Steaks

1. The flesh should be fresh-cut in appearance, the colour resembling that of freshly dressed fish. Texture should be firm. There should be no traces of browning about the edges or drying out of the flesh.

2. The fish has a fresh, mild odour.

3. Wrapped steaks and fillets should be in moisture-proof material with little or no air space between the fish and the wrapping.

Frozen Fish

Frozen fish must be properly handled if it is to reach the consumer in good condition. Deterioration in quality is delayed when the fish is held constantly in the frozen state at -10°F. or below. Changes in this storage temperature during transport or in retail storage cabinets will result in an inferior product. A check on the following points will ensure that fish has been properly handled.

1. Flesh should be solidly frozen when purchased.

2. The flesh should have a firm, glossy appearance with no evidence of drying out, i.e. no white spots or papery corners or edges.

3. There should be no dark spots or discolouration in the flesh and no fading of pink flesh.

4. If wrapped, frozen fillets and steaks should be wrapped in moisture-vapour-proof material. There should be little or no air space between fish and wrapping. A thick layer of frost on the inside of transparent wrappers is evidence of long storage or poor condition or both.

5. The majority of frozen fillets on the market are packaged in waxed cardboard boxes wrapped with waxed paper and machine sealed. The consumer must rely on established brand names and the reputation of the retail outlet as an assurance of quality.

6. Whole fish, frozen in the round or dressed forms are frequently not wrapped. When such is the case, they should be coated with a glaze to prevent desiccation and discolouration.

SHELLFISH

Shellfish deteriorate very rapidly, especially when they have been shucked. It is important that they be strictly fresh when purchased. When purchased in the shell, it is important that they be alive.

Crab and Lobster - When bought alive, crab and lobster should show movement of the legs. The "tail" of live lobster curls under the body and does not hang down when the lobster is picked up. During the process of growth a lobster sheds its hard shell. The shell of a newly moulted lobster is soft and the meat is watery. Gradually as the lobster feeds the shell hardens and the meat becomes firm. At this stage the meat is at its best. To ensure firm, tasty meat, choose a lobster which is heavy for its bulk, and has a hard shell. The tail of a cooked lobster should spring back quickly after it has been straightened out. Cooked lobsters and crabs should be bright red and have no disagreeable odour.

Oysters and Clams - Top quality oysters have hard, well cupped shells. When alive the shells of both clams and oysters are tightly closed or will close on handling. A gaping shell indicates that they are no longer alive and therefore not usable. Oysters, if kept at temperatures above freezing and below 40°F. will remain alive up to a week. Clams will keep for a few days at these temperatures. Shucked oysters and clams should be plump and have clear liquor. Cartons containing clams and oysters should be refrigerated or surrounded by ice.

Scallops - Scallop meat consists only of that muscle that closes the shell of the scallop. Two varieties of scallops are available. The large sea scallop has white meat and the smaller, more delicate bay scallop is creamy or slightly pinkish. Shucked scallops are marketed fresh or frozen. Fresh scallops have a slightly sweetish odour.

Shrimp - Fresh shrimp have a mild sea odour and the meat is firm in texture. The parchment-like covering fits tightly to the body. If the body has shrunk from the shell the shrimp may not be fresh. The colour of the shell may vary from a grayish green to tan, to light pink. When cooked, the shells turn red. The meat changes to a distinctive pink, sometimes with red spots.

Care of Fish in the Home

Because fish spoils rapidly, care should be taken to serve it as soon as possible after purchase. The following precautions will help to maintain quality when holding fish even for short periods.

1. When fresh fish is received from the market, remove the wrapper and wipe it with a clean damp cloth. Wrap it in wax paper, place in a tightly covered container, to prevent transfer of odours, and store in the refrigerator. If the fish is whole, eviscerate it immediately and store it in the same way.

2. Frozen fish should be kept solidly frozen in the unopened package. A very low temperature is required to maintain quality in frozen fish. A constant temperature of -10°F. is recommended and since this low temperature is hard to maintain in household freezer units, it is advisable to keep supplies of frozen fish for relatively short periods. Once the fish has been thawed it must be used quickly since it will spoil as readily as fresh fish. It is not advisable to re-freeze fish that has been thawed. The flesh of fish which has once been frozen is more susceptible to spoilage bacteria than fresh fish and fish that has once been frozen will not absorb the juices again so that the re-frozen product has little flavour and is tough and rubbery. Smoked fish should be handled and stored in the same way as fresh fish. The smoking process is used only to enhance the flavour and is not sufficient to preserve the fish but merely retards spoilage.

Home Freezing of Fish

Freshly caught fish may be frozen and stored in the home freezer. Fish should be eviscerated and washed soon after they are caught. If there is to be any delay before freezing they should be packed in ice and stored in the refrigerator.

Fish may be packed whole, filleted or cut into steaks. Before packing, fish should be rinsed in cold brine (one cup coarse salt to one gallon water) or a two per cent ascorbic acid solution ($4\frac{1}{2}$ tsps. to 4 cups cold water) may be used to delay rancidity in fatty fish. To prevent deterioration as a result of drying or oxidation, fish should be wrapped in moisture-vapour-proof material and packed tightly to exclude air. Heavy aluminum foil, vapour-proof cellophane, pliofilm, polyethylene or laminated freezer paper make satisfactory packaging materials.

The packaged fish should be frozen quickly at low temperature to maintain quality of fish and stored at a constant temperature of $-10^{\circ}F$. Lean fish will keep well if properly frozen for three or four months. Fatty fish should not be kept for more than two months.

Oysters, clams and scallops may be packed in their liquid in jars. They should be completely covered to prevent darkening. Crushed cellophane or foil in the top of the jar will help to keep them covered. Lobsters, crabs and shrimp may be frozen but they tend to toughen in storage.

Fish as a Food

The wide range of taste and texture found in the many different kinds of fish and shellfish products can add variety to the daily menu. Choice of fish usually depends on the amount of money one has to spend for food, but all fish, no matter the cost, contain many elements the body needs. Whether planning an everyday meal or a party, there is a fish or fish product to meet all occasions. The fish muscle is composed of protein, fat, and water. It contains vitamins and minerals.

Proteins in Fish

Fish contains from 15 to 20 per cent protein; about the same proportion as in other protein foods such as meat and poultry. The proteins of fish, like those of meat, eggs, cheese and milk, supply all the essential amino acids. This means that fish alone would be able to supply the body's protein needs for health and growth. Experimental feeding tests have shown that fish is one of the more efficient foods in promoting growth. In fish muscle about three per cent of the protein is connective tissue while in meat muscle it averages 13 per cent. For this reason, fish is never tough and does not require the long slow cooking needed for some cuts of meat. Fish protein is easily digested and experiments on digestibility by human subjects have shown that from 90 to 96 per cent of the protein is digested.

Fat Content of Fish

The fat content in fish varies greatly with the different species. This accounts for some of the great differences in flavour and makes a wide variation in the number of calories provided by fish, e.g. fish of the cod family contain less than one per cent fat in the flesh. Flat fishes such as halibut, are moderately fatty, containing from two to five per cent fat. Fatty fish such as salmon, mackerel, or herring are always relatively fatty but the fat content varies with the season and spawning cycle, e.g. herring may contain as little as five per cent or as much as 22 per cent fat. Fish which contain a small amount of fat have a relatively larger proportion of water, so that the proportion of protein remains approximately constant. Fat in fish flesh is not localized as it is in meat but is distributed throughout the flesh. In certain areas, however, particularly just below the skin, the fat content is higher than elsewhere. The fat of fish is also easily digested.

Vitamins in Fish

The flesh of fatty fish contains a little Vitamin A and is rich in Vitamin D. The lean fish have almost no Vitamin A or D in the flesh. The freshwater eel is exceptional in having a very high content of both Vitamins A and D in the flesh.

Fish oils, found in the liver, provide a reliable source of Vitamins A and D. The vitamins are more concentrated in the livers of fatty species. Livers of halibut and tuna are especially rich in both Vitamins A and D.

Fish, like meat, is a good source of niacin and provides riboflavin as well. The proportions of the different vitamins vary with the species and a certain amount is lost in the cooking.

Mineral Content of Fish

All fish are good sources of phosphorus, iodine, copper and fluorine. Most of the calcium in fish is found in the bones and for this reason it is wise to include the softened bones when eating canned fish. The iron content of fish is rather low and the diet should provide other sources of this mineral. Shellfish such as shucked oysters and clams, which are eaten whole, provide more iron than other fish.

NUTRITIVE VALUE OF SOME COMMON FISH *

FISH 100 gms. EDIBLE PORTION	CALORIES	PROTEIN gms	FAT gms	CARBO-HYDRATE gms	CALCIUM gms	PHOSPHORUS gms	IRON mg	VIT. A I.U.	THIAMINE mg	RIBO-FLAVIN mg	NIACIN mg
COD, Raw	74	16.5	.4	0	.010	.194	.4	0	.06	.09	2.2
CRAB, Fresh	86	16.1	1.6	.6	(.039)	(.160)	(.8)	-	.14	.06	2.7
HALIBUT, Raw	141	23.5	4.5	0	.013	.254	.7	440	.09	.18	6.0
HERRING, Raw	157	14.5	10.5	0	-	-	1.5	100	.04	.11	3.5
LOBSTER, Fresh	88	16.2	1.9	.5	.061	.184	.6	-	(.13)	.06	(1.9)
MACKEREL, Atlantic	188	18.7	12.0	0	.005	.239	1.0	(450)	.15	.35	8.4
OYSTERS, Raw	82	9.8	2.1	5.6	.094	.143	5.6	320	.15	.20	1.2
PICKEREL, Yellow	84	18.7	.5	0	-	-	-	-	-	-	-
**SALMON, Red Spring	193	20.0	12.5	0	-	.254	-	-	-	-	-
**SALMON, Coho	121	20.0	4.5	0	-	-	-	-	-	-	-
SARDINES, Canned (Drained)	214	25.7	11.0	1.2	.386	.586	2.7	220	.02	.17	4.8
SHRIMP, Canned	127	26.8	1.4	-	.115	.263	3.1	60	.01	.03	2.2
SOLE, Raw	81	17.4	.7	0	.110	.264	.9	-	.09	.06	-
TROUT, Lake	167	18.1	10.0	0	.020	.197	1.0	-	.09	.20	3.5
TUNA, Canned (Drained)	198	29.0	8.2	0	(.008)	(.351)	(1.4)	80	.05	.12	12.8
WHITEFISH, Raw	156	22.9	6.5	0	.025	.263	1.3	-	(.09)	(.09)	(4.2)

* Figures from, "TABLE OF FOOD VALUES RECOMMENDED FOR USE IN CANADA". Bracketed figures are imputed values. Dashes show that no value is available.

** Figures from Pacific Fisheries Experimental Station, Vancouver, B. C.

Fish for Everyone

A good diet must provide protein. To supply this essential nutrient, Canada's Food Rules recommend at least one serving daily of fish, meat, poultry or meat alternates such as eggs and cheese. The amount of protein in a serving of fish is comparable to that in other protein foods as seen in the table below.

Average serving	Gms. protein
Cod fillets, 4 oz.	19.0
Salmon steak, 4 oz.	20.0
Salmon canned, 4 oz.	23.0
Sardines, $\frac{1}{2}$ can	12.8
Roast beef, 4 oz.	24.1
Pork chop, 4 oz.	20.0
Roast chicken, 4 oz.	23.0
Eggs, two	11.4
Cheese, cheddar, 1 oz.	7.1
Cheese, cottage, 2 oz.	11.1

The number of calories supplied by fish will vary with the fat content and with the method of preparation. Fish may be classified according to fat content as lean, medium fat, and fat. Some common species of fish are classified below:

Lean	Medium	Fat
Cod	Halibut	Alaska black cod
Haddock	Whitefish	Barbotte
Ocean Perch	Speckled trout	Laketrout
Fresh water perch	Rainbow trout	Mackerel
Pickerel		Salmon
Pike		Shad
Smelt		Tuna
All Shellfish		Turbot

Fish adapts well to many types of diets. All fish are easily digested and boneless lean fish may be included in the diets of very small children. The mild flavoured fish appeal to invalids and the soft texture of most fish makes them suitable for feeding elderly people or for soft and bland diets. Lean fish, poached or baked without added fat, is popular for low fat and low calorie diets while combination with rich sauces or preparation by frying will produce fish dishes which are high in calories and provide satisfying meals. The variation in calories made possible by different cooking methods may be seen in the table below:

Product	Cooking method	Approximate number of calories
Haddock $3\frac{1}{2}$ ounces	Baked or Steamed	80
	Served with $\frac{1}{4}$ cup Tomato sauce	100
	Served with $\frac{1}{4}$ cup cream sauce	180
	Broiled, 1 teaspoon butter added	120
	Fried	160

Fish on the Menu

Attractive, well balanced meals are easy to plan with the aid of Canada's Food Rules. Nutritious fish, properly cooked and attractively served, is an excellent food around which to plan the main meal of the day. Vegetables chosen should complement the fish. Green vegetables provide Vitamins A and C as well as iron. Vegetables served with fish should not only help to balance the meal nutritionally but should provide the contrasts in colour and texture which are needed to make an interesting meal. Bright, crisp green vegetables, colourful salads, delicately flavoured new beets, peas, beans, carrots or squash contrast both in colour and texture with pale coloured fish. The flavour of fish is mild and the strong flavoured vegetables such as turnips, cauliflower and onions tend to mask the delicate flavour of fish. There can, of course, be no hard and fast rule about food combinations. Flavour depends largely on the skill of the cook and many popular fish dishes have a subtle blend of flavours from onions, garlic, chili peppers and other highly flavoured foods. Contrasts in colour are easy to achieve and a wide variety of attractive dishes can be made by skillful use of sauces and garnishes chosen to suit the fish. To add richness and satiety, choose creamy rich sauces such as white, parsley, egg, tartar, hollandaise or cheese. To add colour and flavour, choose highly seasoned sauces such as tomato, creole, ketchup or mustard sauces. Suitable garnishes for fish include lemon wedges and lemon slices, parsley, lettuce, watercress, tomatoes, cucumber, green pepper, fruit slices, celery, pickles, olives and carrot curls.

Fish is not only served as a main course for dinner but can be used in casseroles, salads, sandwiches, soups and chowders for lunch or supper. There are fish recipes suitable for snacks and parties. Fish can also be served for breakfast.

On the following pages the basic methods of preparation and cooking of fish are outlined. If these basic principles are learned the student should be able to prepare any number of delicious fish recipes. Many of these recipes are to be found in Department of Fisheries booklets which are available on request. A few miscellaneous fish recipes with special appeal to the teenagers are also included.

Preparation for Cooking

Steaks and fillets of fish need little preparation for cooking. It is good practice to wipe fish with a damp cloth before using it. Whole, drawn, and dressed fish may be prepared simply in the home by following the instructions below:

1. To remove scales

With one hand hold the tail firmly. With the other hand loosen scales with a dull knife or scaler held at 45° angle and pushed against the skin from the tail towards the head. To remove the entrails, slit the skin from vent to gills with the point of a sharp knife. Remove the viscera, wash away any blood and scrape the backbone area clean.

2. To remove head

Cut across the base of the gills. If the backbone is large, cut through the flesh on each side of the bone, then snap the backbone by bending it over the edge of the table. Remove tail, if desired, by cutting through flesh and snapping backbone as above.

3. To remove fins

Cut through the skin along both sides of fins. Pull fins quickly towards the head to remove root bones.

4. To bone a whole fish

Before removing the tail, continue slit from vent to tail. Cut across from the slit to the back. Holding the tail with one hand, insert the sharp edge of the knife flatly between the flesh and the backbone. Press the knife towards the head, cutting the flesh from the ribs and backbone. Turn the fish over and repeat on the other side. Cut off tail, then lift out bones removing any flesh adhering to them.

5. To fillet a fish

Cut through flesh along the back from the tail to behind the head. Then cut across just below the head. Turn knife flat and starting at the head, cut flesh to the tail, easing the knife over the rib bones. Remove the fillet. Turn fish over and repeat the operation on the other side.

6. To skin a fillet

Hold the tail end skin side down and cut skin from the flesh with quick short strokes. Point knife blade towards skin so that no fish is wasted.

Basic Methods of Cooking Fish

Because fish contains very little connective tissue it does not need long slow cooking, and over-cooked fish is dry and tasteless. Fish cooked quickly at high temperature will retain its flavour and be moist and juicy. Fish may lose much of its natural flavour and tenderness by over-cooking. It should be cooked only until the translucent flesh becomes opaque and the flakes are easily separated with a fork.

There are four basic methods of cooking fish:

In the oven;
In the frying pan;
In deep fat;
In water or milk.

With each of these cooking methods it is important to control the time and temperature of cooking. Fish may be cooked in the oven at a high temperature of 450°F. or over. At this temperature the cooking time will be very short. The thickness of the fish will determine the time needed for cooking. As a general rule oven baked fish will need only 10 minutes for each inch of thickness. When fish is cooked from the frozen state the time of cooking will be doubled, making it 20 minutes for each inch thickness. When fish fillets are baked under a blanket of sauce the cooking time will be slightly longer--an additional five minutes will be needed for each inch of thickness.

When fish is cooked in cream or in sauces containing eggs or cheese, a moderate oven temperature 350°F. should be used to prevent separation or toughening of these proteins. The time needed to fry fish will depend on the size of the pieces as well as on the coating material. Fish cooked in boiling water will require the standard cooking time--10 minutes per inch thickness for fresh fish and 20 minutes per inch thickness for frozen fish. Since fish cooked in milk must be simmered rather than boiled, the cooking time will be lengthened.

1. In The Oven (a) To Bake a Whole Fish

1. Prepare as directed on previous page, wash, scale and remove bone.

2. Stuff the fish loosely with dressing and truss with string. Allow one cup dressing for each pound of fish.

3. Place the fish on a greased pan and brush with melted fat or oil.

4. Measure the thickness of the stuffed fish.

5. Bake in a hot oven (450°F.), allowing 10 minutes per inch of stuffed thickness.

BREAD STUFFING FOR FISH

3 tablespoons chopped onion
3/4 cup chopped celery
3 tablespoons butter
1 teaspoon salt
few grains pepper
1 teaspoon thyme
4 cups bread crumbs

Cook onions and celery in butter until tender--about 10 minutes. Combine all ingredients; mix thoroughly.

(b) Baked Fillets - Spencer Method

2 pounds fish fillets (fresh or frozen)
1/2 cup milk
1 teaspoon salt
3/4 cup fine dry bread crumbs

1. Cut fillets into individual portions.

2. Dip in milk to which salt has been added then in bread crumbs.

3. Place fish on a greased baking dish and dot with butter or other fat.

4. Measure the thickness of the fish.

5. Bake in a hot oven, 450°F., allowing 10 minutes per inch thickness for fresh fish and 20 minutes per inch thickness for frozen fish. Do not thaw frozen fillets before baking.

(c) Broiled Fish

1. Preheat the broiler.

2. Sprinkle fish with salt and pepper. Arrange it on a greased broiler pan and baste with melted fat.

3. Broil the fish 2 to 4 inches from the top heat, depending on the oven. Leave the oven door open slightly unless oven directions state otherwise. If the fish is frozen, place it farther from the heat to prevent the top from burning before the fish is cooked. Allow about 10 minutes broiling time for each inch of thickness if the fish is fresh and about 20 minutes if it is frozen. Turn the fish at half time. Season and baste on the other side. Cook till done. Thin cuts of fish may be broiled without turning.

II In the Frying Pan Sautéed or Pan-Fried Fish

Cut fish into serving size portions and coat with seasoned flour or dip in seasoned milk or beaten egg and roll in cornmeal, dry bread crumbs, cracker or cereal crumbs. For easier handling, frozen fish may be partially thawed and then cooked immediately. Fry quickly on one side, then turn and brown on the other side. It is important to have enough fat to cover the bottom of the pan and to have it very hot but not smoking. For the best results use a fat with a high smoking temperature. Cooking oils are particularly good for this purpose. Pan frying is suitable for steaks, fillets or small whole fish.

III In Deep Fat In Deep Fat

Cut fillets into uniform pieces not thicker than half an inch. If too thick make three or four slits in the sides to facilitate cooking. Sprinkle fish with salt and dip into batter. Fry at 375°F. until golden brown. Drain on absorbent paper. Fillets, smelts, fish cakes and shellfish are good when fried in deep fat. If frozen fish is used, it is better to thaw it partially before using for even cooking throughout. Choice of cooking fat is most important for deep frying. Fats with a high smoking temperature are best and will minimize cooking odours. These fats are also less readily absorbed by the food than those with a low smoking temperature. If the fat has a low smoking point or has become decomposed by constant use, the fried product will become grease soaked and dark in colour. Fat should be strained through a cheese-cloth after use and may be clarified by frying a piece of raw potato in it.

Many types of batter may be used for fried fish. A simple batter may be made from pancake mix or biscuit mix. As a general rule a batter mixed with water will be crisp while milk produces a tender batter.

BATTERS FOR DEEP FRIED FISH

1. 1 cup all-purpose flour
   1 egg
   1 cup water
   salt and pepper

2. 1 1/2 cups all-purpose flour
   1 tablespoon baking powder
   2 eggs
   1 teaspoon salt
   1 cup milk

Mix and sift dry ingredients. Beat eggs and add milk or water. Add liquid to dry ingredients and stir until smooth.

IV In Water or Milk (a) In Water

Portions of whole fish or fillets which are to be used for salads, casseroles, fish cakes or creamed dishes may be cooked in water.

Sprinkle fish with salt. For more flavour add one tablespoon of chopped onion, and one tablespoon of diced celery. Place on a sheet of dampened parchment paper or a piece of greased aluminum foil, and wrap securely. Draw up corners of parchment paper pouch fashion and tie with string or fold foil over fish securing open edges with double folds to make the package water tight. Place the package in rapidly boiling water and cover. When water returns to the boil, time the cooking period. Boil 10 minutes per inch thickness for fresh fish and about 20 minutes per inch thickness for frozen fish. When removing fish from package save the juices to use in sauce.

(b) In Milk

Smoked fish may be poached in milk either in a pan on top of the stove or in a casserole in the oven. The fish will be cooked when it flakes easily with a fork. The milk may be thickened and served as a cream sauce.
Whether fish is cooked in the oven, in the frying pan, in deep fat or in liquid it is most important not to overcook it.
Fish is cooked when:

It changes colour to become opaque
It flakes readily
It is easily pierced with a fork

Fish is properly cooked when it comes to the table moist, tender and full of flavour.

Miscellaneous Fish Recipes

T-V SPECIAL

1 can (6 or 7 ounces) tuna, flaked
1 cup shredded Cheddar cheese
2 tablespoons chopped sweet pickle
2 tablespoons chopped onion
2 tablespoons prepared mustard
6 frankfurter rolls

Combine all ingredients, except the rolls. Cut rolls lengthwise almost through and fill with fish mixture. Wrap each roll in aluminum foil; seal ends and heat in a moderate oven (350°F.) for 20 minutes. Makes 6 servings.

SALMONBURGERS

1 can (15½ ounces) salmon
1 cup soft bread crumbs
1/2 teaspoon salt
1/8 teaspoon pepper
1 tablespoon finely chopped onion
1 egg, well beaten
8 slices raw tomato
8 cooked bacon strips
8 burger buns, heated

Empty contents of can into bowl. Flake salmon, mash bones and mix with salmon liquid. Add bread crumbs, salt, pepper and onion and mix lightly. Add egg and mix well. Shape into eight patties and pan-fry until browned on one side. Turn and brown the other side. Place in heated bun. Top with raw tomato slice and strips of cooked bacon. Makes 8 salmonburgers.

PARTY-FARE FISH STICKS

2 packages (10 ounces each) fish sticks
1 cup pineapple juice
2 tablespoons sugar
2 tablespoons vinegar
1/8 teaspoon garlic salt
1/2 teaspoon soy sauce
1/2 cup pineapple chunks
1/2 green pepper, coarsely chopped or 1/2 cup sliced sweet pickles
1½ tablespoons cornstarch
2 tablespoons cold water

Separate fish sticks and place in shallow pan. Cook in a hot oven (450°F.) for 15 to 20 minutes. Meanwhile drain a can of pineapple chunks and put one cup of the juice, sugar, vinegar, garlic salt and soy sauce in a saucepan and bring to boiling point. Add pineapple and green pepper or pickles. Blend the cornstarch and water together and stir into hot mixture. Cook over medium heat until sauce thickens, stirring constantly. Serve over hot fish sticks. Makes 4 or 5 servings.

QUICK FISH CASSEROLE

1 pound cooked fillets
2 cups cooked rice
3/4 cup chopped onion
1/4 cup chopped green pepper
2 tablespoons butter
1 can (10 ounces) cream of tomato soup
1/2 cup milk
2 cups potato chips, coarsely crushed

Flake fish and add to cooked rice. Cook onion and green pepper in butter until tender. Add them to the fish and rice mixture and mix lightly. Blend soup and milk. Place half of the potato chips in the bottom of a greased 2-quart casserole. Cover with alternate layers of fish and soup mixture. Top with remaining potato chips. Bake in moderately hot oven (450°F.) for about 20 minutes. Makes 6 servings.

FLUFFY CODFISH PIE

1/2 pound dry salt cod or 1 cup freshened, cooked salt cod
4 slices bacon, diced
2/3 cup chopped onion
1/4 cup chopped green pepper
1/4 cup chopped pimiento or sweet red pepper
1 tablespoon flour
1 1/4 cups milk
1/4 teaspoon dried thyme
1/4 teaspoon pepper
2 eggs, separated
1 cooked pie shell (9 inches)

Soak salt cod in cold water overnight and bring to boiling point in fresh water. Fry bacon until crisp; remove from pan and add onion, green pepper, and pimiento and cook until tender. Sprinkle with flour and add 1 cup of milk, stirring until thickened and smooth. Add flaked fish, bacon, thyme and pepper. Beat egg yolks with remaining milk, add to fish mixture. Fill the pie shell and bake in a moderate oven (350°F.) for 20 minutes or until lightly browned. Makes 4 to 6 servings.

Tuna Pie--substitute 1 can (6 or 7 ounces) tuna and 2 tablespoons butter or margarine for the salt cod and bacon. Make the pie according to directions given above.

GRILLED HALIBUT SANDWICHES

1 cup cooked halibut
1/3 cup mayonnaise
1/4 teaspoon salt
1/4 teaspoon Worcestershire sauce
2 tablespoons finely chopped onion
1 teaspoon lemon juice

Flake the fish. Combine the fish with the remaining ingredients. Spread the filling on 3 slices of bread and top with 3 more slices. Trim off crusts if desired. Place in a skillet and brown on both sides. Serve piping hot. Makes 3 sandwiches.

FISH CHOWDER - FRESH OR SMOKED

1 pound fillets, fresh or smoked
2 tablespoons butter or other fat
1 medium onion, thinly sliced
1/2 cup diced celery
2 cups diced raw potatoes
1/2 cup sliced carrots
2 cups boiling water
1 teaspoon salt
1/8 teaspoon pepper
2 cups milk

Cut fillets into bite-size pieces. Melt fat in large saucepan and cook onion and celery until tender. Add potatoes, carrots, water, salt and pepper. Cover and simmer 10 to 15 minutes until vegetables are tender. Add fish and cook 10 minutes longer. Add milk. Reheat but do not boil. Makes 8 servings.

TOASTED SARDINE SANDWICH

4 cans ($3\frac{1}{4}$ ounces each) sardines in mustard sauce
1/4 cup butter or margarine
6 slices bread
6 slices processed cheese
paprika

Add 2 teaspoons mustard sauce from sardines to soft butter or margarine. Mix to spreading consistency. Spread bread with the mustard-butter mixture. Drain sardines and place on bread. Cover each slice of bread with a slice of cheese and sprinkle with paprika. Place on a baking sheet. Toast in a hot oven (450°F.) for 8 to 10 minutes or until cheese melts. Makes 6 servings.

EASY PIZZA PIE

1 cup biscuit mix
1/4 cup milk
2 cans ($3\frac{1}{4}$ ounces each) sardines in oil
1 can (8 ounces) tomato sauce
1 cup grated cheese

Combine biscuit mix with milk. Turn out on a lightly floured board and knead for 10 seconds. Roll out into 11 inch circle and fit into a greased 9 inch pie plate. Flute the edges of the dough, and brush all dough with the salad oil. Drain sardines and place half of them evenly on the dough. Sprinkle one-half cup of cheese over sardines. Pour the tomato sauce over the sardines and cheese and sprinkle with the remaining cheese. Arrange the remainder of the sardines spoke-fashion on top of the cheese. Bake in a moderately hot oven (400°F.) for 20 minutes. Makes 6 servings.

TUNA CRUNCH SALAD

1 can (6 or 7 ounces) tuna
1/4 cup chopped green pepper
1 tablespoon minced onion
1 cup shredded cabbage
1/2 cup salad dressing
2 tablespoons vinegar
2 cups potato chips

To flaked tuna add green pepper, minced onion, cabbage and mix well. Mix salad dressing and vinegar together then fold into salad. Just before serving add potato chips and toss lightly together. Serve on crisp greens. Makes 6 servings.

SALMON APPLE SALAD

1 can (7 3/4 ounces) salmon (sockeye or coho)
1 cup chopped unpeeled apple
1 tablespoon lemon juice
2 cups chopped celery
1/2 cup whole peanuts (optional)
1/4 cup salad dressing

Drain and flake salmon. Sprinkle apple with lemon juice and add to salmon. Add celery, peanuts and salad dressing. Toss ingredients lightly. Serve on lettuce cups. Makes 6 servings.

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